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## ABSTRACT

Developed through a modified DACUM (Developing a Curriculum) process involving business, industry, labor, and community agency representatives in Ohio, this document is a comprehensive and verified employer competency profile for drafting occupations. The list contains units (with and without subunits), competencies, and competency builders that identify the skills needed to enter these occupations. The occupational, academic, and employability skills for this occupation or occupational area are included. Within the outline are three levels of items: core, advancing, and futuring. Core items identify the knowledge, skills, and attitudes essential for entry-level employment. These items are required to be taught and will be the basis for questions on the state vocational competency tests. Advancing items identify the knowledge, skills, and attitudes needed to advance in the occupation; futuring items identify the knowledge, skills, and attitudes needed to enter and remain in a given occupation 3 to 4 years from now. Titles of the 15 units are as follows: basic laboratory skills; geometric constructions; orthographic projections and auxiliary views; sectioning; drawing pictorials; basic intersections and developments; dimensioning; basic computer-aided (CAD) design skills; machine drawings; architectural drawings; structural drawings; civil and survey drafting; electrical and electronic drawings; advanced CAD skills; and employability skills. (KC)

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# OACAP

## OHIO'S COMPETENCY ANALYSIS PROFILE

### DRAFTING

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# What is OCAP?

"A comprehensive and verified employer competency list will be developed and kept current for each program." This is the second objective of Imperative 3 of the *Action Plan for Accelerating the Modernization of Vocational Education: Ohio's Future at Work*. Ohio's Competency Analysis Profile (OCAP) lists are the Division of Vocational and Career Education's response to that objective. OCAP lists evolve from a modified DACUM process involving business, industry, labor, and community agency representatives from throughout Ohio. The OCAP process is directed by the Vocational Instructional Materials Laboratory at The Ohio State University's Center on Education and Training for Employment.

## How is OCAP used?

Each OCAP contains units (with and without subunits), competencies, and competency builders that identify the occupational, academic,\* and employability skills needed to enter a given occupation or occupational area. Within that outline there are three levels of items: core, advancing, and futuring. Core items identify the knowledge, skills, and attitudes essential for entry-level employment. These items will be the basis for questions on the state vocational competency tests (scheduled to begin in school year 1993-94). Advancing items (marked with one asterisk) identify the knowledge, skills, and attitudes needed to advance in a given occupation. Futuring items (marked with two asterisks) identify the knowledge, skills, and attitudes needed to enter and remain in a given occupation three to four years from now.

School districts may add as many units, subunits, competencies, and/or competency builders as desired to reflect local employment needs, trends, and specialties. Local advisory committees should be actively involved in the identification and verification of additional items. Using OCAP lists, instructors will be able to formulate their vocational courses of study and monitor competency gains via the new criterion-referenced competency testing program that will be directly tied to the competencies identified on the OCAP lists.

\*Academic competencies have not been identified for all OCAPs. At a later date math, communication, and science competencies will be released.

The Employability Skills portion of this list was verified by the following employer panel:

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# Ohio Competency Analysis Profile Drafting

Revised 4/92

## Unit 1: Basic Lab Skills

### Competency 1.0.1: Demonstrate use of drafting equipment and supplies

#### *Competency Builders:*

- 1.0.1.1 Use and maintain drafting machines and tools
- 1.0.1.2 Use drafter's, architect's, engineer's, and metric scales
- 1.0.1.3 Select appropriate leads and erasers for drawing
- 1.0.1.4 Select, use, and maintain inking pens
- 1.0.1.5 Identify standard sizes and types of drawing media
- 1.0.1.6 Divide circle into 24 parts of 15 using 30°/60° and 45° triangles
- 1.0.1.7 Use compass to draw circles and arcs
- 1.0.1.8 Use divider
- 1.0.1.9 Measure angles using protractor
- 1.0.1.10 Use irregular curve to construct curved line
- 1.0.1.11 Operate adjustable triangle
- 1.0.1.12 Measure angles using protractor and vernier scale on drafting machine
- 1.0.1.13 Make adjustments to drafting machine to install and align scales

### Competency 1.0.2: Reproduce drawings

#### *Competency Builders:*

- 1.0.2.1 Use reproduction machine
- 1.0.2.2 Make blueline or sepia

### Competency 1.0.3: Demonstrate lettering techniques

#### *Competency Builders:*

- 1.0.3.1 Letter using proper freehand lettering techniques
- 1.0.3.2 Use and maintain mechanical lettering devices

### Competency 1.0.4: Demonstrate line techniques

#### *Competency Builders:*

- 1.0.4.1 Demonstrate correct method for sharpening lead
- 1.0.4.2 Use proper techniques in drawing straight lines, arcs, and circles

## **Unit 2: Geometric Constructions**

### **Competency 2.0.1: Draw straight lines**

#### *Competency Builders:*

- 2.0.1.1 Bisect lines and arcs
- 2.0.1.2 Bisect angles
- 2.0.1.3 Draw parallel lines
- 2.0.1.4 Construct a perpendicular line to a line from a point
- 2.0.1.5 Divide a line into equal parts
- 2.0.1.6 Draw a line perpendicular through a point on a line

### **Competency 2.0.2: Construct angles**

#### *Competency Builders:*

- 2.0.2.1 Construct triangle with sides given
- 2.0.2.2 Construct right triangle
- 2.0.2.3 Construct equilateral triangle with one side given

### **Competency 2.0.3: Construct plane figures**

#### *Competency Builders:*

- 2.0.3.1 Construct squares and rectangles
- 2.0.3.2 Inscribe hexagon inside a circle
- 2.0.3.3 Construct hexagon with distance across flat sides given
- 2.0.3.4 Construct pentagon by inscribing in a circle

### **Competency 2.0.4: Construct circles and arcs**

#### *Competency Builders:*

- 2.0.4.1 Construct a circle through three given points
- 2.0.4.2 Draw an arc tangent to an acute angle and an obtuse angle
- 2.0.4.3 Draw an arc tangent to a right angle
- 2.0.4.4 Draw an arc tangent to a straight line and an arc
- 2.0.4.5 Draw an arc tangent to two arcs

### **Competency 2.0.5: Construct irregular figures**

#### *Competency Builders:*

- 2.0.5.1 Draw an involute of a circle
- 2.0.5.2 Draw an ellipse using the approximate ellipse with compass method
- 2.0.5.3 Draw a parabola
- 2.0.5.4 Draw a parabolic curve joining two points

## Unit 3: Orthographic Projections and Auxiliary Views

### Competency 3.0.1: Sketch orthographic views

#### *Competency Builders:*

- 3.0.1.1 Make a two-view sketch
- 3.0.1.2 Make a three-view sketch

### Competency 3.0.2: Draw multiview projections

#### *Competency Builders:*

- 3.0.2.1 Identify types of planes in orthographic views
- 3.0.2.2 Identify projection lines in orthographic views
- 3.0.2.3 Construct top view
- 3.0.2.4 Construct front view
- 3.0.2.5 Construct right side view
- 3.0.2.6 Construct missing visible and hidden lines
- 3.0.2.7 Construct circles and arcs using a template
- 3.0.2.8 Construct one-view drawing
- 3.0.2.9 Construct two-view drawing
- 3.0.2.10 Construct three-view drawing
- 3.0.2.11 Construct fillets, rounds, and runout

### Competency 3.0.3: Draw auxiliary views

#### *Competency Builders:*

- 3.0.3.1 Construct primary auxiliary view of an inclined plane
- 3.0.3.2 Construct true-size auxiliary view of a curved surface
- 3.0.3.3 Construct true length of an oblique line
- 3.0.3.4 Determine true angle and slope of a line
- 3.0.3.5 Determine true angle between two planes
- 3.0.3.6 Determine visibility of crossing skew lines in space\*
- 3.0.3.7 Determine visibility of a line and a plane that cross in space\*
- 3.0.3.8 Locate piercing point of a line and a plane\*
- 3.0.3.9 Construct secondary auxiliary view of an object
- 3.0.3.10 Construct point view of a line
- 3.0.3.11 Determine true angle between two planes in a secondary auxiliary view\*
- 3.0.3.12 Construct true-size auxiliary view of an oblique plane\*
- 3.0.3.13 Determine shortest distance between a point and a line\*
- 3.0.3.14 Determine shortest distance between two skew lines\*

\* Advancing  
\*\* Futuring



## **Unit 4: Sectioning**

### **Competency 4.0.1: Draw standard sections**

#### *Competency Builders:*

- 4.0.1.1 Construct various material symbols in section
- 4.0.1.2 Construct full section of an object
- 4.0.1.3 Construct half section of an object
- 4.0.1.4 Construct offset section of an object

### **Competency 4.0.2: Draw special sections**

#### *Competency Builders:*

- 4.0.2.1 Construct broken-out section of an object
- 4.0.2.2 Construct removed section of an object
- 4.0.2.3 Construct revolved section of an object
- 4.0.2.4 Construct rib section of an object
- 4.0.2.5 Construct aligned section of an object with holes, ribs, or spokes
- 4.0.2.6 Construct adjacent parts in an assembly section

### **Competency 4.0.3: Draw conventional breaks**

#### *Competency Builders:*

- 4.0.3.1 Construct conventional breaks
- 4.0.3.2 Construct an assembly section

## **Unit 5: Drawing Pictorials**

### **Competency 5.0.1: Create axonometric projections**

#### *Competency Builders:*

- 5.0.1.1 Sketch isometric drawing
- 5.0.1.2 Sketch isometric circles
- 5.0.1.3 Construct axonometric drawing using box method
- 5.0.1.4 Construct angles on an isometric
- 5.0.1.5 Construct isometric circles and arcs
- 5.0.1.6 Construct isometric curves using coordinates
- 5.0.1.7 Construct isometric in center of a drawing media

### **Competency 5.0.2: Create oblique drawings**

#### *Competency Builders:*

- 5.0.2.1 Construct an oblique presentation drawing
- 5.0.2.2 Sketch an oblique drawing

**Competency 5.0.3: Create presentation drawings**

*Competency Builders:*

- 5.0.3.1 Sketch one-point perspective
- 5.0.3.2 Sketch two-point perspective
- 5.0.3.3 Construct one-point perspective
- 5.0.3.4 Construct two-point perspective
- 5.0.3.5 Construct curves in a perspective
- 5.0.3.6 Construct conceptual presentation sketches\*
- 5.0.3.7 Construct design sketches\*
- 5.0.3.8 Construct diametric presentation drawing\*

**Competency 5.0.4: Draw exploded assemblies\***

*Competency Builders:*

- 5.0.4.1 Construct exploded assembly presentation drawing\*
- 5.0.4.2 Label exploded view\*

## **Unit 6: Basic Intersections and Developments**

**Competency 6.0.1: Construct development drawings**

*Competency Builders:*

- 6.0.1.1 Label points, lines, and planes in views
- 6.0.1.2 Identify true lengths and types of lines
- 6.0.1.3 Identify true sizes and types of planes
- 6.0.1.4 Construct lengths of lines and true sizes of planes using auxiliary views
- 6.0.1.5 Construct true lengths of lines using rotation
- 6.0.1.6 Construct true sizes of planes using rotation
- 6.0.1.7 Locate elements of single curved surfaces\*

**Competency 6.0.2: Construct transition drawings**

*Competency Builders:*

- 6.0.2.1 Construct square-to-square transitions
- 6.0.2.2 Construct square-to-round transitions
- 6.0.2.3 Construct rectangular-to-square transitions
- 6.0.2.4 Construct rectangular-to-round transitions

**Competency 6.0.3: Draw intersections**

*Competency Builders:*

- 6.0.3.1 Construct intersections of surfaces
- 6.0.3.2 Construct intersections of surfaces using two-view method\*

**Competency 6.0.4: Construct development models**

*Competency Builders:*

- 6.0.4.1 Construct radial line developments
- 6.0.4.2 Construct parallel line developments
- 6.0.4.3 Construct special developments using triangulation

\* Advancing  
\*\* Futuring



## **Unit 7: Dimensioning**

### **Competency 7.0.1: Demonstrate dimensioning techniques**

#### *Competency Builders:*

- 7.0.1.1 Construct arrowheads
- 7.0.1.2 Dimension arcs
- 7.0.1.3 Dimension angles
- 7.0.1.4 Dimension curves
- 7.0.1.5 Dimension rounded-end shapes
- 7.0.1.6 Dimension spherical objects
- 7.0.1.7 Dimension cylindrical objects
- 7.0.1.8 Dimension tapers
- 7.0.1.9 Dimension cones, pyramids, and prisms
- 7.0.1.10 Dimension features on a circular center line
- 7.0.1.11 Dimension a theoretical point of intersection
- 7.0.1.12 Dimension an object using a rectangular coordinate system
- 7.0.1.13 Dimension an object using a polar coordinate system
- 7.0.1.14 Dimension an object using a tabular coordinate system
- 7.0.1.15 Dimension an object using an ordinate dimensioning system
- 7.0.1.16 Apply symbols for surface and texture control
- 7.0.1.17 Add notes to drawing

### **Competency 7.0.2: Interpret and apply tolerances**

#### *Competency Builders:*

- 7.0.2.1 Interpret decimal tolerance dimensions
- 7.0.2.2 Calculate and dimension clearance fit tolerances of mating parts
- 7.0.2.3 Calculate and dimension interference fit tolerances of mating parts
- 7.0.2.4 Calculate and assign tolerances to mating parts using standard fit tables

### **Competency 7.0.3: Apply geometric tolerances\***

#### *Competency Builders:*

- 7.0.3.1 Apply positional and form tolerancing symbols\*
- 7.0.3.2 Apply symbols for true position\*
- 7.0.3.3 Apply symbols for maximum material control and regardless of feature size\*

## **Unit 8: Basic Computer-aided Design (CAD) Skills**

### **Competency 8.0.1: Demonstrate basic computer skills**

#### *Competency Builders:*

- 8.0.1.1 Start up and shut down CAD system
- 8.0.1.2 Format disk
- 8.0.1.3 Copy files
- 8.0.1.4 Delete files
- 8.0.1.5 Change directory
- 8.0.1.6 Rename files
- 8.0.1.7 Create directory\*

### **Competency 8.0.2: Set drawing parameters**

#### *Competency Builders:*

- 8.0.2.1 Create new drawing
- 8.0.2.2 Set drawing scale
- 8.0.2.3 Set sheet size

### **Competency 8.0.3: Create drawing entities**

#### *Competency Builders:*

- 8.0.3.1 Operate input device
- 8.0.3.2 Apply knowledge of draw commands
- 8.0.3.3 Control coordinates
- 8.0.3.4 Control display scale
- 8.0.3.5 Construct lines
- 8.0.3.6 Create text

### **Competency 8.0.4: Edit drawing entities**

#### *Competency Builders:*

- 8.0.4.1 Apply knowledge of editing commands
- 8.0.4.2 Erase lines/text
- 8.0.4.3 Move lines/text
- 8.0.4.4 Modify lines/text

### **Competency 8.0.5: Control viewing**

#### *Competency Builders:*

- 8.0.5.1 Apply knowledge of viewing commands
- 8.0.5.2 Control display scale (e.g., zoom)
- 8.0.5.3 Control line/text colors

**Competency 8.0.6: Use drawing aids**

*Competency Builders:*

- 8.0.6.1 Apply knowledge of drawing-aid commands
- 8.0.6.2 Control line/text snap modes (e.g., grid)
- 8.0.6.3 Identify line/text values (e.g., list)

**Competency 8.0.7: Save drawing files**

*Competency Builders:*

- 8.0.7.1 Apply knowledge of utilities commands
- 8.0.7.2 Save drawings to storage devices
- 8.0.7.3 Plot drawings on media

**Competency 8.0.8: Create symbols and libraries**

*Competency Builders:*

- 8.0.8.1 Create symbols (e.g., blocks and Wblocks)
- 8.0.8.2 Save and modify symbols

**Competency 8.0.9: Manage and control symbols, layers, and line types**

*Competency Builders:*

- 8.0.9.1 Integrate symbols into CAD menu
- 8.0.9.2 Create layers and line types
- 8.0.9.3 Modify layers and change line entities

**Competency 8.0.10: Create attributes**

*Competency Builders:*

- 8.0.10.1 Identify line and text attributes
- 8.0.10.2 Extract line and text attributes from CAD drawing

## **Unit 9: Machine Drawings**

**Competency 9.0.1: Apply tolerances and fits**

*Competency Builders:*

- 9.0.1.1 Tolerance dimensions on drawing
- 9.0.1.2 Calculate and dimension clearance fit tolerances using standard fit tables
- 9.0.1.3 Calculate and dimension interference fit tolerances using standard fit tables
- 9.0.1.4 Calculate and assign tolerances to mating parts using standard fit tables
- 9.0.1.5 Calculate and dimension hole size limits for standard dowels

**Competency 9.0.2: Apply geometric tolerances\***

*Competency Builders:*

- 9.0.2.1 Dimension object using position and form tolerances\*
- 9.0.2.2 Select appropriate datum points and reference features\*

\* Advancing  
\*\* Futuring

**Competency 9.0.3: Draw assemblies**

*Competency Builders:*

- 9.0.3.1 Draw set of detail drawings
- 9.0.3.2 Draw assembly drawing
- 9.0.3.3 Complete detailed title block and revision block
- 9.0.3.4 Complete parts list
- 9.0.3.5 Make drawing revision
- 9.0.3.6 Determine ranges of motion of moving parts to ensure clearances\*
- 9.0.3.7 Draw design layout\*

**Competency 9.0.4: Draw fasteners**

*Competency Builders:*

- 9.0.4.1 Draw thread symbols
- 9.0.4.2 Draw threaded fasteners
- 9.0.4.3 Draw welded assembly drawing
- 9.0.4.4 Draw spring drawings to include specifications
- 9.0.4.5 Draw keys in assembled positions

**Competency 9.0.5: Detail fluid power drawings\***

*Competency Builders:*

- 9.0.5.1 Identify fittings from written descriptions and draw symbols\*
- 9.0.5.2 Draw single-line drawings of screwed and socket weld pipe fittings\*
- 9.0.5.3 Draw single-line drawings of welded pipe fittings\*
- 9.0.5.4 Draw double-line drawings of welded pipe fittings\*
- 9.0.5.5 Dimension and draw single-line pipe assembly and detail\*

**Competency 9.0.6: Detail cam and gear drawings\***

*Competency Builders:*

- 9.0.6.1 Construct spur gear drawing\*
- 9.0.6.2 Construct bevel gear\*
- 9.0.6.3 Construct worm and worm gear\*
- 9.0.6.4 Calculate gear ratios\*
- 9.0.6.5 Determine gear rotation\*
- 9.0.6.6 Calculate gear speeds\*
- 9.0.6.7 Draw cam drawing\*
- 9.0.6.8 Select chain drive\*
- 9.0.6.9 Select V-belt drive\*
- 9.0.6.10 Select types of bearings from handbooks\*

**Competency 9.0.7: Design mechanical project\***

*Competency Builders:*

- 9.0.7.1 Prepare design layout\*
- 9.0.7.2 Perform supporting calculations\*
- 9.0.7.3 Prepare detail drawings\*

\* Advancing  
\*\* Futuring

## **Unit 10: Architectural Drawings**

### **Competency 10.0.1: Draw and dimension floor plan**

#### *Competency Builders:*

- 10.0.1.1 Draw kitchen
- 10.0.1.2 Draw sleeping area
- 10.0.1.3 Draw bathroom
- 10.0.1.4 Draw living area
- 10.0.1.5 Draw traffic patterns
- 10.0.1.6 Draw storage facilities

### **Competency 10.0.2: Draw plot plan**

#### *Competency Builders:*

- 10.0.2.1 Develop orientation of plot
- 10.0.2.2 Draw site plan

### **Competency 10.0.3: Draw foundation plan**

#### *Competency Builders:*

- 10.0.3.1 Detail foundation section using slab, crawl space, or basement construction
- 10.0.3.2 Draw floor plan from preliminary sketch

### **Competency 10.0.4: Draw elevations**

#### *Competency Builders:*

- 10.0.4.1 Sketch two different elevations of same floor plan
- 10.0.4.2 Draw front and side elevation
- 10.0.4.3 Draw front elevation on uneven terrain

### **Competency 10.0.5: Prepare schedules**

#### *Competency Builders:*

- 10.0.5.1 Prepare door and window schedule
- 10.0.5.2 Prepare bill(s) of material

### **Competency 10.0.6: Draw sections and details**

#### *Competency Builders:*

- 10.0.6.1 Draw stairway layout
- 10.0.6.2 Draw fireplace construction details
- 10.0.6.3 Draw typical cabinet details
- 10.0.6.4 Draw door and window section details
- 10.0.6.5 Draw wall section detail

### **Competency 10.0.7: Draw roof plan**

#### *Competency Builders:*

- 10.0.7.1 Sketch different roofs on an elevation
- 10.0.7.2 Identify types of trusses

**Competency 10.0.8: Interpret and draw electrical plan**

*Competency Builders:*

- 10.0.8.1 Apply knowledge of National Electric Code (NEC)\*
- 10.0.8.2 Calculate service size and minimum number of circuits\*
- 10.0.8.3 Locate receptacle, switch, and lighting outlets

**Competency 10.0.9: Interpret and draw plumbing plan**

*Competency Builders:*

- 10.0.9.1 Draw plumbing drawing of building drain system
- 10.0.9.2 Draw plumbing drawings for residential building

**Competency 10.0.10: Create presentation drawings\***

*Competency Builders:*

- 10.0.10.1 Locate vanishing points\*
- 10.0.10.2 Draw one-point perspective\*
- 10.0.10.3 Draw two-point perspective\*
- 10.0.10.4 Shade and shadow various objects\*
- 10.0.10.5 Render an elevation\*
- 10.0.10.6 Render perspectives\*

**Competency 10.0.11: Design a residential structure\***

*Competency Builders:*

- 10.0.11.1 Prepare design layout\*
- 10.0.11.2 Perform supporting calculations\*
- 10.0.11.3 Prepare detail drawings\*

## **Unit 11: Structural Drawings**

**Competency 11.0.1: Draw structural steel shapes**

*Competency Builders:*

- 11.0.1.1 Identify standard produced shapes in cross section
- 11.0.1.2 Interpret standard classifications of shapes
- 11.0.1.3 Locate data for shapes in *The American Institute of Steel Construction Manual*

**Competency 11.0.2: Draw structural connections**

*Competency Builders:*

- 11.0.2.1 Draw and dimension structural members and connections in detail
- 11.0.2.2 Identify common structural steel fastening methods

**Competency 11.0.3: Draw erection plans**

*Competency Builders:*

- 11.0.3.1 Draw and dimension structural members in plan
- 11.0.3.2 Develop bill of materials for structural steel

\* Advancing  
\*\* Futuring



**Competency 11.0.4: Draw structural details**

*Competency Builders:*

- 11.0.4.1 Identify common structural steel fabrication materials
- 11.0.4.2 Identify common concrete members
- 11.0.4.3 Draw details of concrete members

## **Unit 12: Civil and Survey Drafting**

**Competency 12.0.1: Gather data, information, and drawings from county mapping department**

*Competency Builders:*

- 12.0.1.1 Identify topographical drawings of area(s)
- 12.0.1.2 Identify topographical features of area(s)
- 12.0.1.3 Identify common types of maps

**Competency 12.0.2: Set up transit**

*Competency Builders:*

- 12.0.2.1 Level tripod head
- 12.0.2.2 Mount and level transit

**Competency 12.0.3: Operate transit**

*Competency Builders:*

- 12.0.3.1 Focus cross hairs
- 12.0.3.2 Adjust sight focus
- 12.0.3.3 Run levels and cross sections and record notes

**Competency 12.0.4: Shoot boundary lines**

*Competency Builders:*

- 12.0.4.1 Convert azimuths to bearings and bearings to azimuths
- 12.0.4.2 Locate intersections
- 12.0.4.3 Record field notes

**Competency 12.0.5: Generate completed survey drawing**

*Competency Builders:*

- 12.0.5.1 Plot points by coordinate method
- 12.0.5.2 Draw traverses, contours, and profiles

## **Unit 13: Electrical and Electronic Drawings**

### **Competency 13.0.1: Draw electrical assemblies**

#### *Competency Builders:*

- 13.0.1.1 Identify components
- 13.0.1.2 Locate components according to engineer's sketch
- 13.0.1.3 Create assembly
- 13.0.1.4 Detail components
- 13.0.1.5 Draw wiring harness

### **Competency 13.0.2: Draw electrical wiring diagrams**

#### *Competency Builders:*

- 13.0.2.1 Determine connections
- 13.0.2.2 Apply knowledge of symbols

### **Competency 13.0.3: Draw electronic assemblies**

#### *Competency Builders:*

- 13.0.3.1 Locate components according to engineer's sketch
- 13.0.3.2 Create assembly
- 13.0.3.3 Detail components

### **Competency 13.0.4: Draw electronic schematics**

#### *Competency Builders:*

- 13.0.4.1 Draw connections according to engineer's sketch
- 13.0.4.2 Apply knowledge of symbols

## **Unit 14: Advanced Computer-aided Design (CAD) Skills\***

### **Competency 14.0.1: Use third-party software\***

#### *Competency Builders:*

- 14.0.1.1 Demonstrate knowledge of text editors\*
- 14.0.1.2 Use text editors\*

### **Competency 14.0.2: Use macro/LISP capabilities\***

#### *Competency Builders:*

- 14.0.2.1 Load macro/LISP files\*
- 14.0.2.2 Program macro/LISP routines\*

\* Advancing  
\*\* Futuring

**Competency 14.0.3: Develop three-dimensional drawings\***

*Competency Builders:*

- 14.0.3.1 Create three-dimensional displays\*
- 14.0.3.2 Create three-dimensional shapes\*
- 14.0.3.3 Modify three-dimensional shapes\*

## **Unit 15: Employability Skills**

### **Subunit 15.1: Career Development**

**Competency 15.1.1: Investigate career options**

*Competency Builders:*

- 15.1.1.1 Determine interests and aptitudes
- 15.1.1.2 Identify career options
- 15.1.1.3 Research occupations matching interests and aptitudes
- 15.1.1.4 Select career(s) that best match(es) interests and aptitudes
- 15.1.1.5 Identify advantages and disadvantages of career options, including nontraditional careers
- 15.1.1.6 Assess differences in wages, annual incomes, and job opportunities based on geographic location
- 15.1.1.7 Develop a career plan

**Competency 15.1.2: Analyze potential barriers to employment**

*Competency Builders:*

- 15.1.2.1 Identify common barriers to employment
- 15.1.2.2 Describe strategies to overcome employment barriers

## **Unit 15: Employability Skills**

### **Subunit 15.2: Decision Making and Problem Solving**

**Competency 15.2.1: Apply decision-making techniques in the workplace**

*Competency Builders:*

- 15.2.1.1 Identify the decision to be made
- 15.2.1.2 Compare alternatives
- 15.2.1.3 Determine consequences of each alternative
- 15.2.1.4 Make decisions based on values and goals
- 15.2.1.5 Evaluate the decision made

**Competency 15.2.2: Apply problem-solving techniques in the workplace**

*Competency Builders:*

- 15.2.2.1 Diagnose the problem and its causes
- 15.2.2.2 Identify alternatives and their consequences in relation to the problem
- 15.2.2.3 Examine multicultural and nonsexist dimensions of problem solving
- 15.2.2.4 Utilize resources to explore possible solutions to the problem
- 15.2.2.5 Compare and contrast the advantages and disadvantages of each solution
- 15.2.2.6 Determine appropriate action
- 15.2.2.7 Evaluate results

## **Unit 15: Employability Skills**

### **Subunit 15.3: Work Ethic**

**Competency 15.3.1: Evaluate the relationship of self-esteem to work ethic**

*Competency Builders:*

- 15.3.1.1 Identify special characteristics and abilities in self and others
- 15.3.1.2 Identify internal and external factors that affect self-esteem

**Competency 15.3.2: Analyze the relationship of personal values and goals to work ethic both in and out of the workplace**

*Competency Builders:*

- 15.3.2.1 Distinguish between values and goals
- 15.3.2.2 Determine the importance of values and goals
- 15.3.2.3 Evaluate how values affect goals
- 15.3.2.4 Identify short-term and long-term goals
- 15.3.2.5 Prioritize personal goals
- 15.3.2.6 Describe how personal values are reflected in work ethic
- 15.3.2.7 Describe how interactions in the workplace affect personal work ethic
- 15.3.2.8 Examine how life changes affect personal work ethic

**Competency 15.3.3: Demonstrate work ethic**

*Competency Builders:*

- 15.3.3.1 Examine factors that influence work ethic
- 15.3.3.2 Exhibit characteristics that reflect an appropriate work ethic

## **Unit 15: Employability Skills**

### **Subunit 15.4: Job-Seeking Skills**

#### **Competency 15.4.1: Prepare for employment**

##### *Competency Builders:*

- 15.4.1.1 Identify traditional and nontraditional employment sources
- 15.4.1.2 Utilize employment sources
- 15.4.1.3 Research job opportunities, including nontraditional careers
- 15.4.1.4 Interpret equal employment opportunity laws
- 15.4.1.5 Explain the critical importance of personal appearance, hygiene, and demeanor throughout the employment process
- 15.4.1.6 Prepare for generic employment tests and those specific to an occupation/organization

#### **Competency 15.4.2: Design a résumé**

##### *Competency Builders:*

- 15.4.2.1 Identify personal strengths and weaknesses
- 15.4.2.2 List skills and/or abilities, career objective(s), accomplishments/achievements, educational background, and work experience
- 15.4.2.3 Demonstrate legible written communication skills using correct grammar, spelling, and concise wording
- 15.4.2.4 Complete résumé using various formats
- 15.4.2.5 Secure references

#### **Competency 15.4.3: Complete and process job application forms**

##### *Competency Builders:*

- 15.4.3.1 Explain the importance of an application form
- 15.4.3.2 Identify ways to obtain job application forms
- 15.4.3.3 Describe methods for handling illegal questions on job application forms
- 15.4.3.4 Demonstrate legible written communication skills using correct grammar, spelling, and concise wording
- 15.4.3.5 Return application to proper person, request interview, and follow up

#### **Competency 15.4.4: Demonstrate interviewing skills**

##### *Competency Builders:*

- 15.4.4.1 Investigate interview environment and procedures
- 15.4.4.2 Explain the critical importance of personal appearance, hygiene, and demeanor
- 15.4.4.3 Demonstrate question and answer techniques
- 15.4.4.4 Demonstrate methods for handling difficult and/or illegal interview questions

**Competency 15.4.5: Secure employment**

*Competency Builders:*

- 15.4.5.1 Identify present and future employment opportunities within an occupation/organization
- 15.4.5.2 Research the organization/company
- 15.4.5.3 Use follow-up techniques to enhance employment potential
- 15.4.5.4 Compare and evaluate job offers

**Unit 15: Employability Skills**

**Subunit 15.5: Job Retention Skills**

**Competency 15.5.1: Analyze the organizational structure of the workplace**

*Competency Builders:*

- 15.5.1.1 Identify and evaluate employer expectations regarding job performance, work habits, attitudes, personal appearance, and hygiene
- 15.5.1.2 Be aware of and obey all company policies and procedures
- 15.5.1.3 Examine the role/relationship between employee and employer
- 15.5.1.4 Recognize opportunities for advancement and reasons for termination

**Competency 15.5.2: Maintain positive relations with others**

*Competency Builders:*

- 15.5.2.1 Exhibit appropriate work habits and attitude
- 15.5.2.2 Identify behaviors to establish successful working relationships
- 15.5.2.3 Cooperate and compromise through teamwork and group participation
- 15.5.2.4 Identify alternatives for dealing with harassment, bias, and discrimination based on race, color, national origin, sex, religion, handicap, or age

**Unit 15: Employability Skills**

**Subunit 15.6: Job Advancement**

**Competency 15.6.1: Analyze opportunities for personal and career growth**

*Competency Builders:*

- 15.6.1.1 Determine opportunities within an occupation/organization
- 15.6.1.2 Compare and contrast other opportunities
- 15.6.1.3 List benefits of job advancement
- 15.6.1.4 Evaluate factors involved when assuming a new position within or outside an occupation/organization



**Competency 15.6.2: Exhibit characteristics needed for advancement**

*Competency Builders:*

- 15.6.2.1 Display a positive attitude
- 15.6.2.2 Demonstrate knowledge of a position
- 15.6.2.3 Perform quality work
- 15.6.2.4 Adapt to changing situations and technology
- 15.6.2.5 Demonstrate capability for different positions
- 15.6.2.6 Participate in continuing education/training programs
- 15.6.2.7 Respect, accept, and work with ALL individuals in the workplace

## **Unit 15: Employability Skills**

### **Subunit 15.7: Technology in the Workplace**

**Competency 15.7.1: Assess the impact of technology in the workplace**

*Competency Builders:*

- 15.7.1.1 Cite how past business/industry practices have influenced present business/industry processes
- 15.7.1.2 Investigate the use of technology in the workplace
- 15.7.1.3 Analyze how present skills can be applied to learning new technologies

**Competency 15.7.2: Use a variety of technological applications**

*Competency Builders:*

- 15.7.2.1 Explore basic mathematical, scientific, computer, and technological principles
- 15.7.2.2 Use technology to accomplish assigned tasks
- 15.7.2.3 Create solutions to problems using technical means

## **Unit 15: Employability Skills**

### **Subunit 15.8: Lifelong Learning**

**Competency 15.8.1: Apply lifelong learning to individual situations**

*Competency Builders:*

- 15.8.1.1 Define lifelong learning
- 15.8.1.2 Identify factors that cause the need for lifelong learning

**Competency 15.8.2: Adapt to change**

*Competency Builders:*

- 15.8.2.1 Analyze the effects of change
- 15.8.2.2 Identify reasons why goals change
- 15.8.2.3 Describe the importance of flexibility when reevaluating goals
- 15.8.2.4 Evaluate the need for continuing education/training

## **Unit 15: Employability Skills**

### **Subunit 15.9: Economic Education**

#### **Competency 15.9.1: Analyze global enterprise system**

##### *Competency Builders:*

- 15.9.1.1 Identify characteristics of various enterprise systems
- 15.9.1.2 Examine the relationship between competition, risk, and profit
- 15.9.1.3 Illustrate how supply and demand influence price

#### **Competency 15.9.2: Evaluate personal money management**

##### *Competency Builders:*

- 15.9.2.1 Describe the need for personal management records
- 15.9.2.2 Identify methods of taxation
- 15.9.2.3 Analyze how credit affects financial security
- 15.9.2.4 Compare types and methods of investments
- 15.9.2.5 Prepare a personal budget
- 15.9.2.6 Be an informed and responsible consumer
- 15.9.2.7 Analyze the effects of advertising on the consumer

## **Unit 15: Employability Skills**

### **Subunit 15.10: Balancing Work and Family**

#### **Competency 15.10.1: Analyze the effects of family on work**

##### *Competency Builders:*

- 15.10.1.1 Recognize how family values, goals, and priorities are reflected in the workplace
- 15.10.1.2 Identify present and future family structures and responsibilities
- 15.10.1.3 Describe personal and family roles
- 15.10.1.4 Analyze concerns of working parent(s)
- 15.10.1.5 Examine how family responsibilities can conflict with work
- 15.10.1.6 Resolve family-related conflicts
- 15.10.1.7 Explain how to use support systems/community resources to help resolve family-related conflicts

#### **Competency 15.10.2: Analyze the effects of work on family**

##### *Competency Builders:*

- 15.10.2.1 Identify responsibilities associated with paid and nonpaid work
- 15.10.2.2 Compare the advantages and disadvantages of multiple incomes
- 15.10.2.3 Explain how work can conflict with family responsibilities
- 15.10.2.4 Explain how work-related stress can affect families
- 15.10.2.5 Identify family support systems and resources

## **Unit 15: Employability Skills**

### **Subunit 15.11: Citizenship in the Workplace**

**Competency 15.11.1: Exercise the rights and responsibilities of citizenship in the workplace**

*Competency Builders:*

- 15.11.1.1 Identify the basic rights and responsibilities of citizenship
- 15.11.1.2 Examine the history and contributions of all racial, ethnic, and cultural groups

**Competency 15.11.2: Cooperate with others in the workplace**

*Competency Builders:*

- 15.11.2.1 Identify situations in which compromise is necessary
- 15.11.2.2 Examine how individuals from various backgrounds contribute to work-related situations
- 15.11.2.3 Demonstrate initiative to facilitate cooperation
- 15.11.2.4 Give and receive constructive criticism to enhance cooperation

## **Unit 15: Employability Skills**

### **Subunit 15.12: Leadership**

**Competency 15.12.1: Evaluate leadership styles appropriate for the workplace**

*Competency Builders:*

- 15.12.1.1 Identify characteristics of effective leaders
- 15.12.1.2 Compare leadership styles
- 15.12.1.3 Demonstrate effective delegation skills
- 15.12.1.4 Identify opportunities to lead in the workplace

**Competency 15.12.2: Demonstrate effective teamwork skills**

*Competency Builders:*

- 15.12.2.1 Identify the responsibilities of a valuable group member
- 15.12.2.2 Exhibit open-mindedness
- 15.12.2.3 Identify methods of involving each member of a team
- 15.12.2.4 Contribute to the efficiency and success of a group
- 15.12.2.5 Determine ways to motivate others

**Competency 15.12.3: Utilize effective communication skills**

*Competency Builders:*

- 15.12.3.1 Identify the importance of listening
- 15.12.3.2 Demonstrate assertive communication
- 15.12.3.3 Recognize the importance of verbal and nonverbal cues and messages
- 15.12.3.4 Analyze written material
- 15.12.3.5 Prepare written material
- 15.12.3.6 Give and receive feedback
- 15.12.3.7 Articulate thoughts
- 15.12.3.8 Use appropriate language

**Unit 15: Employability Skills**

**Subunit 15.13: Entrepreneurship**

**Competency 15.13.1: Evaluate the role of small business in the economy**

*Competency Builders:*

- 15.13.1.1 Identify the benefits of small business to a community
- 15.13.1.2 Analyze opportunities for small business in a community

**Competency 15.13.2: Examine considerations of starting a business**

*Competency Builders:*

- 15.13.2.1 Research a business idea
- 15.13.2.2 Compare various ways to become a small business owner
- 15.13.2.3 Investigate factors to consider in financing a new business
- 15.13.2.4 Evaluate entrepreneurship as a career option

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